Basic Physics

F.Y. Diploma : Sem. I

EVALUATION SYSTEM

	Time	Marks
Theory Exam	2 Hrs.	50
Practical Exam	–	25@
Oral Exam	–	–
Term Work	–	–
Sessional Work (Two Test)	–	25 (each)

@ : Internal Assessment

SYLLABUS

1. Properties of Solids

Specific Objectives

– Calculate the Young's Modulus of material of wire.

- **Elasticity:** Definitions of deforming force, restoring force, elasticity, plasticity, Factors affecting elasticity.
- **Stresses:** Tensile, Compressive, Volumetric and Shear stress,
- **Strains:** Tensile, Volumetric and Shear strain.
- Elastic limit, Hooke's law.
- **Elastic co-efficient -** Young's modulus, bulk modulus, modulus of rigidity and relation between them
- Stress-strain diagram, behavior of wire under continuously increasing load, yield point, ultimate stress, breaking stress, factor of safety, compressibility, Poisson's ratio.

2. Properties of Liquids

Specific objectives

– Determine the surface tension of the given liquid

– Determine the coefficient of viscosity by Stoke's method.

2.1 Fluid friction

- Pressure, pressure-depth relation ($P = \rho h g$), atmospheric pressure, Pascal's law, Archimedes's principle.
- Viscous force, definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its SI unit.
- Streamline and turbulent flow with examples, critical velocity, Reynold's number and its significance.
- Up thrust force, terminal velocity, Stokes law, and derivation of coefficient of viscosity by Stoke's method, effect of temperature and adulteration on viscosity of liquid.

2.2 Surface tension

- Cohesive and adhesive force, Laplace's molecular theory of surface tension, Surface Tension: definition and unit, effect of temperature on surface tension.
- Angle of contact, Capillarity and examples of capillary action, derivation of expression for surface tension by capillary rise method, applications of surface tension.

3. Thermal Properties of Matter

Specific objectives

- Distinguish between isothermal and adiabatic process.
- Determine the relation between specific heats.

3.1 Modes of Transformation of Heat

- Difference between heat and temperature, definition of calorie, Absolute zero, units of temperature: °C, °F, °K with their conversion.
- Conduction, law of thermal conductivity, coefficient of thermal conductivity, good conductors of heat & insulators with suitable examples, applications of conduction. Convection, applications of convection. Radiation, applications of radiation.

3.2 Gas laws

- Gas Laws: Boyle's law, Charles law, Gay lussac's law (Statement and mathematical equation only)
- Perfect gas equation (PV = RT) (No derivation), specific heat of a substance, SI unit, specific heat of gas at constant volume (C_V) specific heat of gas at constant pressure (C_P), ratio of specific heat, Mayer's relation between C_P and C_V, isothermal process, adiabatic process, difference between isothermal process and adiabatic process.

4. Optics

Specific objectives

- Calculate refractive index of prism.
- Determine the numerical aperture of optical fiber

4.1 Refraction of Light

- Refraction of monochromatic light, Snell's law, Derivation of prism formula, total internal reflection, critical angle.
- Optical fibre: principle, structure of optical fiber, propagation of light wave through optical fibre, derivation of numerical aperture and acceptance angle.

5. Wave motion

Specific objectives

- Differentiate between transverse waves and longitudinal waves
- Derive expression for displacement, velocity and acceleration of a body executing SHM

5.1 Wave Motion

- Definition of a wave, wave motion, wave velocity, wave period, wave frequency, wave length, vibratory motion, periodic motion, amplitude of a vibrating particle, derivation of $v = n\lambda$
- Simple harmonic motion (SHM), examples of SHM, equation of SHM, expression of velocity and acceleration of a body executing SHM.
- Types of progressive waves: transverse and longitudinal waves with examples.

5.2 Resonance

- Stationary wave, formation of stationary wave, examples of stationary wave, characteristics of stationary waves, free and forced vibrations with examples.
- Resonance: definition of resonance, examples of resonance, formula to calculate velocity of sound by resonance tube method.

Reference Books

1. Engineering Physics (*B.L. Theraja*), S. Chand Publishers - New Delhi
2. Engineering Physics (*V. Rajendran*), Tata McGraw-Hill Publications
3. Conceptual Physics (*P. G. Hewitt*), Pearson education (Tenth edition)
4. Physics – Std. XI, Std. XII, HSC board/CBSE Board
5. Engineering Physics (*R.K.Gaur and S.L.Gupta*), Dhanpat Rai Publication, New Delhi.

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